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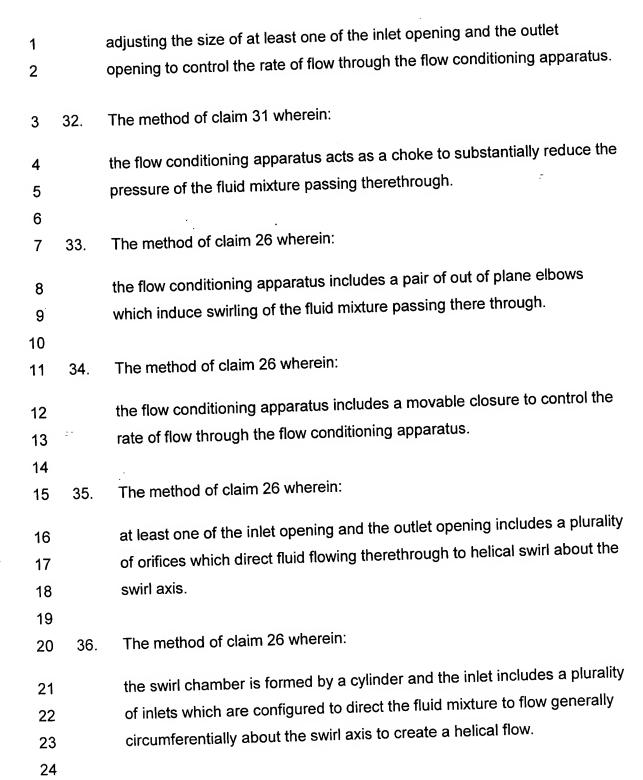
WHAT IS CLAIMED IS: 1 2 A separation system for separating liquid components of differing densities 3 1. from a fluid mixture, the system comprising: a flow conditioning apparatus and a cooperating liquid separation 5 apparatus disposed downstream from and in fluid communication with the 6 flow conditioning apparatus; 7 8 the flow conditioning apparatus having an inlet, an outlet and a swirl 9 chamber extending along a curvilinear swirl axis and located between the 10 inlet and the outlet, the inlet and outlet being configured to cooperate with 11 the swirl chamber to induce the swirling of a fluid mixture about the swirl 12 axis such that when a fluid mixture having liquid components of differing 13 densities passes through the swirl chamber, centrifugal forces are 14 imparted upon the liquid components to induce coalescence of droplets in 15 at least one of the liquid components; 16 and the liquid separation apparatus being capable of separating liquids of 17 differing densities; 18 wherein the existence of the coalesced droplets in a fluid mixture received 19 from the cooperating flow conditioning apparatus by the separation 20 apparatus enhances the separation efficiency of the liquid separation 21 22 apparatus. 23 The system of claim 1 wherein at least one of the inlet and the outlet is 24 2. configured to direct a fluid mixture to flow generally circumferentially about 25 the swirl axis to induce the swirling of a fluid mixture in the swirl chamber 26 when passing through the swirl chamber.

1	3.	The system of claim 1 wherein at least one of the inlet and the outlet is
2		configured to direct a fluid mixture generally tangentially to a surface
3		enclosed by an inner wall of the swirl chamber to induce the swirling of a
4		fluid mixture when passing through the swirl chamber.
5		
6	4.	The system of claim 2 wherein both the inlet and the outlet are configured.
7		to direct a fluid mixture to flow generally circumferentially about the swirl
8		axis to induce the swirling of a fluid mixture when passing through the
9		swirl chamber.
10		fluid mixture into the swirl
11	5.	The system of claim 1 wherein the inlet directs a fluid mixture into the swirl
12		chamber at a distance offset from the swirl axis to induce the fluid mixture
13		to swirl helically about the swirl axis.
14		the
15	6.	The system of claim 1 wherein the inlet includes an inlet opening and the
16		flow control apparatus includes a movable closure which cooperates with
17		the inlet to control the size of the inlet opening.
18		was to be a secured anoning which
19	7.	The system of claim 1 wherein the outlet includes an outlet opening which
20		directs a fluid mixture to flow generally tangentially to the curved surface
21		enclosed by the swirl chamber as the fluid mixture passes through the
22		outlet opening.
23		the of orifices
24	8.	The system of claim 1 wherein the outlet includes a plurality of orifices.
25		w. 6 is as are erronged in 3
26	9.	The system of claim 8 wherein the plurality of orifices are arranged in a
27		spiral configuration relative to the swirl axis.
28		in the size which are
29	10.	•
30		generally elongate and curved.
31		

1 2	11.	The system of claim 1 wherein the flow conditioning apparatus includes a plunger which moves relative to the outlet to control the flow of fluid
3		through the outlet.
4		
5	12.	The system of claim 1 wherein the swirl chamber is annular and is at least
6		partially formed by cooperating inner and outer cylinders.
7		
8	13.	The system of claim 12 wherein the outlet includes a plurality of spaced
9		apart orifices formed in the inner cylinder.
10		~
11	14.	The system of claim 13 wherein the orifices are arranged in a spiral
12		configuration relative to the swirl axis.
40	4.5	The system of claim 13 wherein the flow conditioning apparatus includes a
13	15.	movable member which moves relative to the orifices to adjust through
14		which of the orifices the fluid mixture may pass.
15 16		WHICH OF the offices the hald mixture may f
17	16.	The system of claim 13 wherein the orifices are elongate and curved in
18	10.	periphery and direct a fluid mixture passing therethrough to spiral about
19		the swirl axis
20		
21	17.	The system of claim 13 wherein the flow conditioning apparatus includes a
22		movable member which moves relative to the orifices to control through
23		which of the orifices the fluid mixture may pass.
24		
25	18.	The system of claim 1 wherein the flow conditioning apparatus acts as a
26		choke to substantially reduce the pressure of a fluid mixture passing
27		through the flow conditioning apparatus.
28		

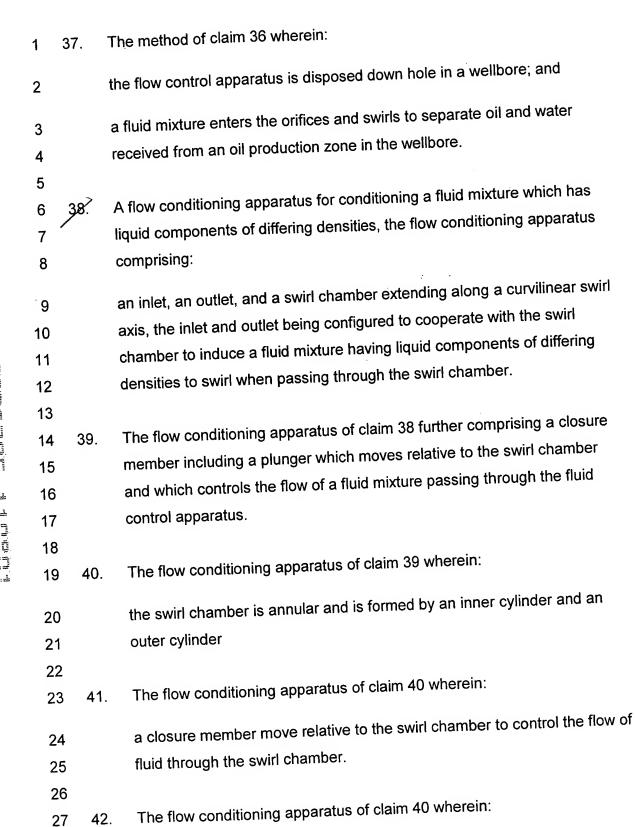
		the barbar has a spiral vane
1	19.	The system of claim 1 wherein the swirl chamber has a spiral vane
2		disposed therein to induce the fluid mixture to swirl when passing through
3		the swirl chamber.
4	00	The system of claim 1 wherein the swirl chamber is at least partially
5	20.	formed by a pair of substantially out of plane elbows which induce a fluid
6		mixture to swirl when passing through the swirl chamber.
7		mixture to swiri when passing through the
8		the flow conditioning apparatus is a control
9	21.	The system of claim 1 wherein the flow conditioning apparatus is a control
10		valve which controls the rate of flow.
11		anation apparatus
12	22.	The system of claim 1 further comprising a gas separation apparatus
13		disposed upstream of and in fluid communication with the flow
14		conditioning apparatus.
15		
16	23.	The system of claim 1 wherein the liquid separation apparatus is an oil
	20.	and water separator.
17		
18	- 4	The system of claim 1 wherein the separation apparatus is one of a gravity
19	24.	separator, a hydrocyclone, and a membrane separator.
20		separator, a hydrocyclone, and a memory
21		The system of claim 1 further comprising a wellhead for an oil producing
22	25.	The system of claim 1 further comprising a weinterstand with the flow
23		well disposed upstream from and in fluid communication with the flow
24		conditioning apparatus.
25	5	s viriant densities from a
26	3 26,	A method of separating liquid components of differing densities from a
27	7	fluid mixture, the method comprising the steps of:
28	8	passing a fluid mixture having liquid components of differing densities conditioning apparatus, the flow conditioning apparatus baying an inlet with an inlet opening, an outlet with an outlet opening; and
DP 2	9 .,,	through a flow conditioning apparatus, the now conditioning apparatus, the north conditioning apparatus, the north conditioning apparatus and the north conditioning apparatus, the north conditioning apparatus and the north conditioning and the north conditioning apparatus and the north conditioning a
3	0	having an inlet with an inlet opening, an outlet with an outlet opening; and

1 2 3 4		a swirl chamber disposed there between with the inlet and outlet being configured relative to the swirl chamber such that the flow of the fluid mixture through the inlet to the swirling chamber and out the outlet induces swirling of the fluid mixture with droplets of at least one of the
5		liquid components coalescing; and
6 7 8 9		passing the fluid mixture to a cooperating liquid separator apparatus wherein the liquid components of differing densities are separated with the efficiency of the separator apparatus being enhanced by the existence of the coalesced droplets created by the flow conditioning apparatus.
10	27.	The method of claim 26 wherein the liquids, which are separated, are
11	21.	received from a wellbore.
12		
13	28.	The method of claim 26 wherein:
14		the swirl chamber extends along a swirl axis; and
15 16 17		at least one of the inlet and the outlet directs the fluid mixture to flow generally circumferentilly about the swirl axis.
17	29.	The method of claim 28 wherein:
19 20		the outlet includes a plurality of orifices.
21	30.	The method of claim 29 wherein:
22 23		the orifices are configured to direct the fluid mixture passing therethrough generally circumferentially about the swirl axis.
24 25	31.	The method of claim 26 further comprising the step of:
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1		the inner cylinder has an outlet including a plurality of orifices.
2		40 tarain
3	43.	The flow conditioning apparatus of claim 42 wherein:
4		the plurality of orifices are arranged in a spiral pattern about the swirl axis.
5		
6	44.	The flow conditioning apparatus of claim 42 wherein:
7 8		the orifices are configured to direct a fluid mixture, passing through the orifices, generally circumferentially about the swirl axis
9 10	45.	The flow conditioning apparatus of claim 44 wherein:
11		at least one of the orifices has peripheries which are generally elongated
12		and curved in shape.
		and our voa in one,
13 14	46.	The flow conditioning apparatus of claim 40 further comprising:
15		an exit conduit in fluid communication with the outlet.
16 17	47.	The flow conditioning apparatus of claim 41 further comprising:
18		a drive mechanism for controlling the movement of the closure member.
19		
20		
21		the inlet includes an inlet conduit which extends generally perpendicular to
22		the swirl chamber and is offset from the swirl axis so as to introduce a fluid
23		mixture into the swirl chamber generally tangentially to the curved surface
24		enclosed by the swirl chamber.
2	5 49	. The flow conditioning apparatus of claim 38 further comprising:

1		a movable closure member which moves relative to the inlet to control the
2		flow of fluid through the apparatus.
3		
4	50.	The flow conditioning apparatus of claim 49 wherein:
5		the movable closure member is a spiral vane disposed in the swirl
6		chamber and a fluid mixture spirals about the vane when passing through
7		the swirl chamber.
8		
9	51.	The flow conditioning apparatus of claim 50 wherein:
10		the spiral vane moves relative to the inlet chamber to vary the length of
11		contact between a fluid mixture passing through the swirl chamber and the
12		spiral vane.
13		
14	52 .	A flow conditioning apparatus comprising:
15		an inlet, and outlet and a swirl chamber disposed there between and
16		extending along a swirl axis; and
17		an adjustable closure member for adjusting the rate of flow through one of
18		the inlet opening and the outlet opening;
19		wherein fluid helical swirls about the swirl axis when passing through the
20		flow conditioning apparatus.